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ATTORNEY DOCKET NO. 04159.0001U3
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	
	)	
FRIEDMAN et al.	)	Art Unit: **2157**
	)	
Application No. **09/702,094**	)	Examiner: **Avi M. Gold**
	)	
Filing Date: **October 30, 2000**	)	Confirmation No. **7881**
	)	
For: **GEO-INTELLIGENT TRAFFIC MANAGER**	)	

TRANSMITTAL LETTER

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer Number 23859

May 8, 2007

Sir:

Transmitted herewith is the following in the above-identified application:

- ☒ Information Disclosure Statement
- ☐ Fee as calculated below
- ☒ No Additional Fee Required
- ☐ Corrected Drawings
- ☐ Petition to Extend Time
- ☐ Supplemental Declaration
- ☐ Terminal Disclaimer
- ☒ Other Two References (181 Pages and 3 Pages)

	CLAIMS AS AMENDED					
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE		ADDITIONAL FEE
Total Claims			0	X $50.00		$0.00
Independent Claims			0	X $200.00		$0.00
☐ First Presentation of a Multiple Dependent Claim				+ $360.00		$0.00
EXTENSION FEE	1st Month $120 ☐	2nd Month $450 ☐	3rd Month $1020 ☐	4th Month $1590 ☐	5th Month $2160 ☐	$0.00
☐ Reduction by ½ for filing by SMALL ENTITY (Note 37 C.F.R. §1.9, §1.27, §1.28) -						- $0.00
TOTAL FEE DUE						$0.00

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Payment:

☐ A check in the amount of $_____ is enclosed.

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WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

☐ The Commissioner is authorized to charge our Deposit Account No. 14-0629 in the amount of $____ to cover the above-listed additional fees. A duplicate copy of this transmittal is enclosed.

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Respectfully submitted,

NEEDLE & ROSENBERG, P.C.

Jason S. Jackson
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CERTIFICATE OF EXPRESS MAILING UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence, including any items indicated as attached or included, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: **Mail Stop AMENDMENT**, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

Jason S. Jackson — Date: 5-8-2007

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INFORMATION DISCLOSURE STATEMENT

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer Number 23859

Sir:

Pursuant to the requirements of 37 C.F.R. § 1.56, submitted herewith on the accompanying Information Disclosure Statement List is a listing of documents known to the Applicant and/or its attorney. In accordance with 37 C.F.R. § 1.98(a)(2), copies of any cited U.S. patent or U.S. patent application publication documents are not enclosed. Copies of any cited foreign patent document and/or any non-patent publication are enclosed. Consideration of the cited documents and making the same of record in prosecution of the above-referenced application ("Application") are respectfully requested.

The Applicant would also like to bring additional information to the attention of the Examiner which may be material to patentability. Specifically, the Applicant would like to bring to the attention of the Examiner the existence of co-pending U.S. Patent Application Serial No. 10/106,523, filed on March 25, 2002 ("'523 Application") which claims priority to the Application. The Examiner of the '523 Application has cited to U.S.P.N. 6,130,890, issued to Leinwand, to support a rejection of claims in the '523 Application. Claims of the Application have also been rejected over Leinwand. In both cases, the Applicant has made amendments and arguments to distinguish claims from Leinwand. Accordingly, the Applicant would like to bring

the '523 Application to the attention of the Examiner because it may contain information material to patentability under M.P.E.P. § 2001.06(b).

This Information Disclosure Statement is believed to be filed in a timely manner pursuant to 37 C.F.R. § 1.97(b)(3), in that a first Office Action on the merits has not yet been mailed to the Applicant.

No fee is believed due; however, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

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Jason S. Jackson — Date: 5-8-2007

INFORMATION DISCLOSURE STATEMENT LIST

(Use as many sheets as necessary)

Complete if Known	
Application Number	09/702,094
Filing Date	October 30, 2000
First Named Inventor	FRIEDMAN et al.
Group Art Unit	2157
Examiner Name	Avi M. Gold

U.S. PATENT DOCUMENTS

Examiner's Initials	Cite No.	Document No.	Date	Name	Class	Subclass	Filing Date (if appropriate
		6684250	01-27-2004	Anderson et al.	709	225	
		6529475	03-04-2003	Wan	370	231	
		6347078	02-12-2002	Narvaez-Guarnieri et al.	370	230	
		6332158	12-18-2001	Risley et al.	709	219	
		6330239	12-11-2001	Suzuki	370	395	
		6327677	12-04-2001	Garg et al.	714	37	
		6285748	09-04-2001	Lewis	379	113	
		6285660	09-04-2001	Ronen	370	259	
		6272150	08-07-2001	Hrastar et al.	370	486	
		6266607	07-24-2001	Meis et al.	701	117	
		6069939	05-30-2000	Fung et al.	379	67.1	
		5974457	10-26-1999	Waclawsky et al.	709	224	
		5920697	07-06-1999	Masters et al.	395	200.49	
		5774668	06-30-1998	Choquier et al.	395	200.53	
		5459863	10-17-1995	Taylor	395	600	
		5231631	07-27-1993	Buhrke et al.	370	60	
		4939726	07-03-1990	Flammer et al.	370	94.1	
		4939723	07-03-1990	Harley, Jr. et al.	370	84	

FOREIGN PATENT DOCUMENTS

Examiner's Initials	Cite No.	Foreign Patent Document Country Code-Number-Kind Code	Date	Name	Translation Yes/No
		WO 01/75632	10-11-2001	Quova, Inc.	

NON-PATENT DOCUMENTS

Examiner's Initials	Cite No.	Non-Patent Citations (include Author, Title, Publisher, Relevant Pages, Date and Place of Publication)
		Roussea, Jean-Marc; Roy, Serge: GeoRoute: An Interactive Graphics System for Routing and Scheduling Over Street Networks; IEEE Sept. 1989; Pages: 161-163.

Examiner Signature:	Date Considered:

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

GeoRoute: An Int ractiv Graphics System for Routing and Scheduling over Street Networks

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INTRODUCTION

GeoRoute is a multi-purpose graphical tool for applications requiring a network representation of streets in urban and rural areas. It differs from other geographical information systems in its unique underlying data structure. This structure is adapted to routing and scheduling problems for various types of delivery and public works vehicles. In such cases, information is required about street-to-street connectivity, one-way streets, street types and illegal turns at intersections.

GeoRoute includes the functions required to keep the geographical database up-to-date, locate items on the street network, automatically and/or interactively generate optimized vehicle routes and produce colour maps using standard plotting devices.

The street database is not stored in either bit-mapped or vector form, but rather using an original street segment coding scheme. Streets are stored as links and exploded when required for maps or displays. This structure allows large urban networks to be treated globally on standard personal computers running MS-DOS: network partitioning is not required as is the case with most other GIS software.

GeoRoute is being used in a variety of situations including trip planning for transit customers based on both planned and real-time schedules, route optimization for armoured cars, milk pick-up in rural areas, and public works planning. It can be used for routing problems involving either a series of nodes to be visited (e.g. school transportation, goods distribution) or a series of arcs to be covered (e.g. street sweepers, parking meter maintenance, letter carrier). Address location, shortest path determinations and travel time estimates can be calculated in real-time, opening up opportunities for the use of GeoRoute software in the new generation of on-board vehicle computers.

SYSTEM COMPONENTS

GeoRoute is composed of five main modules. Depending on the particular application, these can be put together in different ways to form a complete application package.

Network editor

The basic module is an interactive-graphic network editor used to consult and update the street network. Streets can be added or modified using a mouse in typical computer-aided design fashion. Descriptive information can be managed using associated alphanumeric screens. This includes street names, civic number ranges, postal codes on each side of the street, one-way information, allowed turns at each intersection, vehicle speed and traffic restrictions.

It is important to stress that changes made interactively with the editor directly modify the internal street network database. Changes are made to the actual network rather than to an image of the network, and therefore immediately affect routing decisions.

This module also serves as an address location system. Segments on the network can be located by providing either a civic address, a postal code, or an intersection. Pointing with the mouse is another method. Once an address has been located, the system then knows its coordinates, its zone in whatever zoning scheme is employed, and its position on the street network. This address to location geocoding function has proved useful in itself: one example is the assignment of court summons to bailiffs for delivery since each bailiff has a certain geographical zone to cover.

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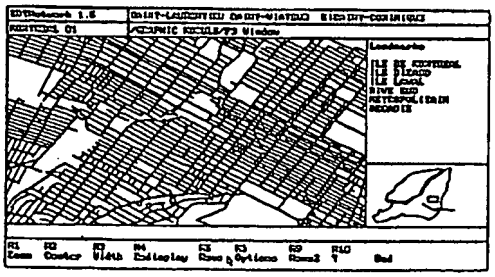

Figure 1: The network editor can treat large urban networks. This figure shows part of Montreal area network.

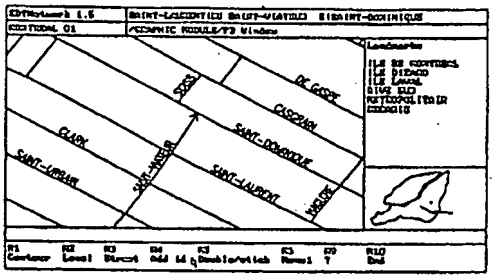

Figure 2: Using a zoom command, smaller areas can be displayed together with street names.

Item location and database

The second module allows the location of user-defined items on the street network. These items can be displayed with specific icons and can be described by records in a relational database. Examples are postal relay boxes, bus stops, pay telephones, pick-up and delivery locations, fire hydrants, schools and public works construction sites.

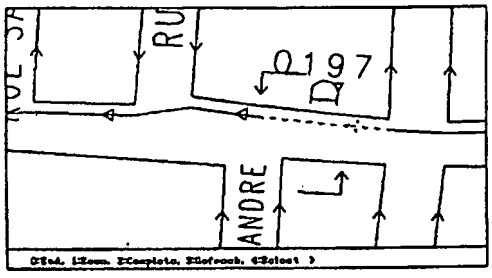

Figure 3: Items to be visited such as mail boxes can be located on the street network.

The important feature is that these items are located based on their association with a street segment in addition to their x-y coordinates: this association is essential in routing and scheduling applications.

Also, from the length of the arc and/or from the number of items on the segment, it is possible to calculate the work required to serve that street segment.

Interactive vehicle route editor

The third module is an interactive vehicle route editor. This allows the definition and display of vehicle routes over the network. Various commands are available to build up the routes, swap segments between adjacent routes and otherwise fine-tune itineraries. Application-dependant cost calculations are built in to measure the efficiency of each route and of the overall solution. Similarly, the system can verify that constraints are not violated. For example, for milk pick-up, the capacity of the vehicle is a constraint; in street sweeping, runs can not exceed a certain time limit; for armoured cars, the vehicle must arrive on the same side of the street as the pick-up location.

Route optimization algorithms

Automated route generation and optimization algorithms have been developed. These have been shown to save from 5 to 15% in total costs and can have considerable impact on large-scale problems. They also permit rapid generation of routes between two points on the network in situations where real-time responses are required.

While the specifics of each application dictate the way that the routes will be generated, GeoRoute has been developed with general-purpose parameter-driven algorithms. Three basic algorithms have been developed: route planning to visit a series of nodes, route planning to cover a set of arcs and shortest path determinations.

Route generation involving pick-ups and deliveries at a set of nodes on the network applies in a variety of situations: servicing clients or distributing goods to convenience stores is a good example. Route generation over arcs is a more difficult problem and one that has received less attention. Examples here are street-sweeping, home postal delivery, garbage collection, electrical meter reading, etc.

The kind of parameters available to tailor GeoRoute algorithms include vehicle capacity, whether the vehicle is subject to traffic restrictions, whether the vehicle must visit both sides of the street, the maximum number of vehicles available and the dwell time at a stop. Vehicle speed functions can be supplied when and if vehicle speed is dependant on the distance between two stops. Penalties can be applied to turns as this tends to be slower than straight-line travel.

The system also allows the use of several different algorithms for each phase of the actual route generation process. This allows experimentation by consultant or knowledgeable client personnel to determine the most efficient method for the specific problem at hand, in terms of minimization of the cost function and of the computer time required to produce an acceptable solution.

Shortest path determinations are used in situations where GeoRoute is used as a basis for address-to-address travel. An example is trip planning over public transit networks. Here, the best route available is different at different times of the day because of variations in service frequencies and the availability of express buses. At the C.T.C.R.O. in Hull, Quebec, this public information system also takes into account late-running buses using information supplied by an automatic vehicle location system. To allow for real-time calculations, travel times for frequently-used paths between the major sectors of the city are pre-calculated.

Map generation and plotting

One of the attractive features of GeoRoute is the ability to produce good quality colour maps on standard plotters at a relatively low cost. This allows hard-copy output of the street network with the various items located on it. These maps can be thematic in nature, showing only certain items or certain types of streets.

Also, while streets are stored as simple links, they can be exploded and displayed in double-segment mode.

Since map output on a plotter can take a fair amount of time for large networks and a complex set of routes, GeoRoute's map generation module includes a WYSIWYG feature which lets the user examine beforehand on the screen exactly what will be sent to plotter.

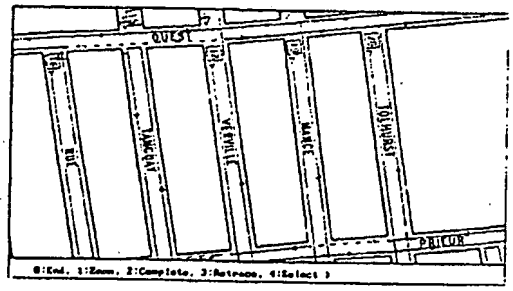

Figure 4: Maps can be viewed in WYSIWYG form on the screen before being sent to the plotter

COMPUTER CONFIGURATION AND DATABASES

One of the advantages of GeoRoute is that it runs on standard MS-DOS machines with 640K of memory, a hard disk and an EGA or VGA colour adaptor. Local-area network configurations are also possible. A VAX version is also available, with PCs acting as graphic workstations attached to the central minicomputer.

The basic street network information can be obtained using Statistics Canada's Area Master Files (AMF) or from the U.S. Government's TIGER files. Clean and updated versions of these files are also available from several commercial firms.

GeoRoute can also be interfaced with existing geographical information system databases that store information in the more traditional vector format. In such cases, the GIS is used to keep the network information up-to-date as this tends to be a centralized activity. GeoRoute can read this information, convert it to its internal database format and then use it for routing applications. In addition, maps generated by GeoRoute can be passed back to the GIS for further editing if necessary.

CONCLUSION

GeoRoute is thus a multi-purpose tool with a host of applications that we ourselves are only beginning to discover. It combines the mapping, editing and address location functions of geographical information system software with automated vehicle routing algorithms and an interactive route editor.

In the context of vehicle navigation, GeoRoute has mainly served to date for advance planning and optimization of vehicle itineraries. However, in dispatch-type situations, the system could be used for dynamic trip planning. It is already being used for real-time location-to-location routing and this is a serious potential application for vehicle on-board computers.